

process of decomposition; the latter being more fixed and not susceptible of change by causes which entirely destroy the combinations of the former. Let a piece of wood or straw, grains of wheat, or any other vegetable substances be exposed to a red heat, with free access of air, and we find, after a certain time, that their forms are changed, their bulk very much diminished, and a large proportion of their weight dissipated, there being left behind only a small quantity of what are commonly called *ashes*. These are the inorganic, or mineral, whilst the parts which have disappeared are the *organic* constituents of vegetable structure.

The part which has disappeared in the air is that portion of plants which was almost entirely obtained from the air during their growth, the part remaining and called the ashes, that which composes the inorganic or *mineral part*, is that portion furnished *entirely* by the soil, because it does not and cannot exist in the air.

The part which is dissipated by heat, called organic or vegetable matter, forms by far the largest proportion of the weight and bulk of all vegetable and animal structures, composing generally from ninety to ninety-eight per cent. of their weight. Although the elements of organic matter form so large a proportion of all living bodies, yet they are not more essential to their existence than the inorganic or mineral portion.

The elements or constituent parts of organic matter are Carbon, Oxygen, Hydrogen, and Nitrogen, which, by their combinations with each other, form by far the largest part of the weight of all living bodies. Some of these elements, moreover, constitute the water which is found in the earth, the matter of the atmosphere which we breathe, and also in combination with mineral matter a very large proportion of the solid parts of the earth. Bodies existing so abundantly, so widely disseminated throughout the universe, are most important subjects for consideration and for attentive study. They are things which must be known, before successful agriculture can be practiced.

ORGANIC ELEMENTS.

CARBON AND CARBONIC ACID.—Of all the constituents of vegetable life, carbon is the most abundant. In its pure state it exists as a solid, differing in this respect from the other three, which naturally exist in an aeriform or gaseous state. It is the essential principle of the different varieties of charcoal. It is the chief constituent of all of those immense beds of bituminous and anthracite coal found in various parts of the earth. It is abundantly formed by burning wood, with but slight access of air, and can also be produced in a very pure form from sugar, turpentine, starch